Overhaul Instructions *and* Parts Catalog

ARC TYPE CA-10A COMPUTER AMPLIFIER

Aircraft Radio Corporation Boonton, New Jersey

Dependable Airborne Electronic Equipment Since 1928

RCOC-CD1-1
pril 1958

Printed in U.S.

CONTENTS

Paragraph		Page
	SECTION I - GENERAL INFORMATION	
1-1	Introduction	1
1-2	Purpose	1
1-3	Description	1
1-4	Weight and Dimensions	1
	SECTION II - DISASSEMBLY	
2-1	General	2
2-2	Disassembly	2
	SECTION III - CLEANING, INSPECTION, REPAIR, AND REPLACEMENT	
3-1	General	6
3-2	Cleaning Materials and Protective Agents	6
3-3	Cleaning, Inspection, Repair, and Replacement	6
	SECTION IV - REASSEMBLY	
4-1	General	8
4-2	Reassembly	8
	SECTION V - TESTING	
5-1	General	11
5-2	Special Equipment	11
5-3	Preliminary Procedure	11
5-4	Testing	11
	Oscillator Test -- Gyro Slaving Amplifier Test -- Heading Bridge Test and Adjustment -- Heading Computer Test and Adjustment.	

SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.

This book provides overhaul procedures for the ARC Type CA-10A Computer Amplifier (Figure 1-1), manufactured by Aircraft Radio Corporation, Boonton, New Jersey. Instructions are included for disassembly, cleaning, inspection, repair, replacement, reassembly and testing.

1-2. PURPOSE.

The CA-10A is used in the ARC Type CD-1 Course Director to slave the G-12 Slaved Gyro to agree with the CT-10 Compass Transmitter. The CA-10A also develops a d-c voltage related to the difference between the aircraft's heading and the desired heading set into the S-10 Director Control or the IN-14 Course Indicator. The developed voltage is combined with the d-c voltage obtained from the VOR or localizer equipment to present a visual indication by deflection of the vertical needle of the cross-pointer meter.

1-3. DESCRIPTION.

The CA-10A is a four-tube unit which, with proper external wiring, may be used with either a 14-volt or 28-volt source of primary power. All input and output connections are made through two connectors on the front of the chassis. The CA-10A is mounted on the ARC Type M-27 Mounting.

1-4. WEIGHT AND DIMENSIONS.

The CA-10A weighs 2.7 pounds and is 4-3/4 inches wide, 4-11/16 inches high, and 6-3/4 inches long.

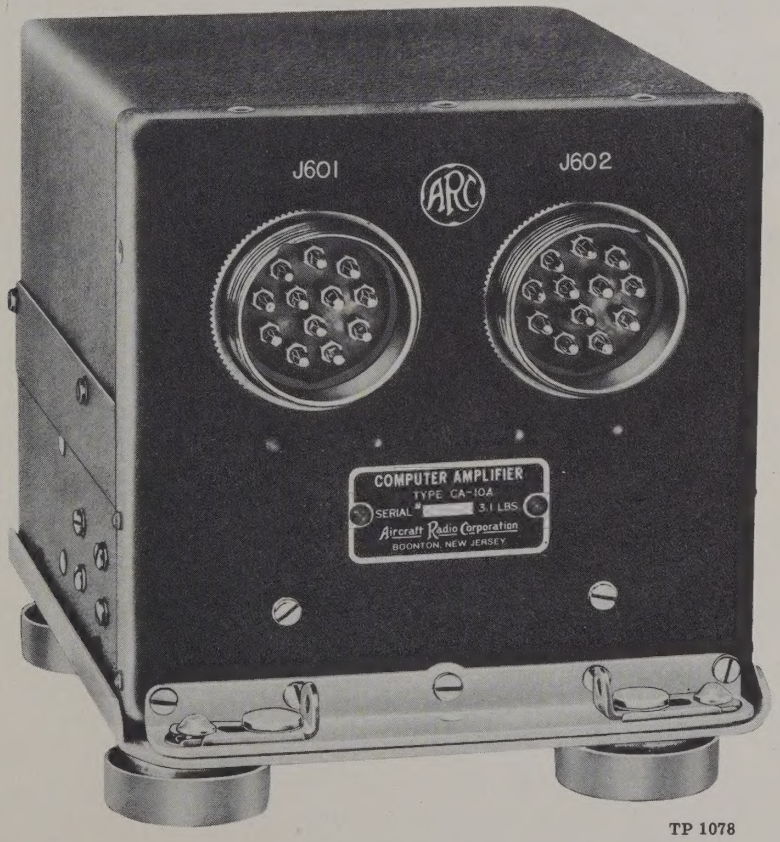


Figure 1-1. ARC Type CA-10A Computer Amplifier

SECTION II

DISASSEMBLY

2-1. GENERAL.
This section contains instructions for disassembly of the ARC Type CA-10A Computer Amplifier. Obvious procedures, such as the unsoldering of wiring, are not included.

2-2. DISASSEMBLY. (See Figure 2-1.)

Note

Disassemble the CA-10A only to the extent required for the necessary repair and replacement.

Step 1. Remove ten screws (2) and lift cover assembly (1) from chassis assembly (84).

Step 2. Unscrew four screws (4) and lift shield assembly (3) from chassis assembly (84).

Step 3. Remove five screws (6) releasing bracket assembly (5) from chassis assembly (84).

Step 4. Withdraw tubes (7) and (8) from sockets (20).

Step 5. Remove two screws (10) releasing two inserts (9) from chassis assembly (84).

Step 6. Detach two nuts (12) and two lockwashers (13) releasing transformer (11).

Step 7. Remove screws (15), (17), and (19) to remove transformers (14), (16), and (18).

Step 8. Remove eight screws (21) and remove four sockets (20).

Step 9. Detach two screws (23), washers (24) and (25) releasing two insulator assemblies (22). Unsolder capacitor (26) from insulator assemblies (22).

Step 10. Remove locknuts (28), (32), and (36), mounting nuts (29), (33), and (37), and lockwashers (30), (34), and (38) and remove variable resistors (27), (31), and (35).

Step 11. Remove two screws (40) releasing terminal board (39). If necessary unsolder resistor, capacitors, or semiconductor devices.

Step 12. Remove ten screws (49) releasing five terminal boards (48). If necessary unsolder resistors.

Step 13. Detach four screws (65) releasing plate assembly (64). If necessary unsolder resistors, capacitors, or semiconductor devices.

Step 14. Remove four screws (74) to release two capacitors (73).

Step 15. Detach nuts (76) and (78) freeing connectors (75) and (77) from chassis assembly (84).

Step 16. Detach nut (80) and washer (81) to remove emblem (79).

KEY TO FIGURE 2-1

1. COVER ASSEMBLY
2. SCREW (SEMS)
3. SHIELD ASSEMBLY
4. SCREW (SEMS)
5. BRACKET ASSEMBLY
6. SCREW (SEMS)
7. TUBE
8. TUBE
9. INSERT
10. SCREW (SEMS)
11. TRANSFORMER
12. NUT
13. LOCKWASHER
14. TRANSFORMER
15. SCREW (SEMS)
16. TRANSFORMER
17. SCREW (SEMS)
18. TRANSFORMER
19. SCREW (SEMS)
20. SOCKETS
21. SCREW (SEMS)
22. INSULATOR ASSEMBLY
23. SCREW
24. RUBBER WASHER
25. WASHER
26. CAPACITOR
27. VARIABLE RESISTOR
28. LOCKNUT
29. MOUNTING NUT
30. LOCKWASHER
31. VARIABLE RESISTOR
32. LOCKNUT
33. MOUNTING NUT
34. LOCKWASHER
35. VARIABLE RESISTOR
36. LOCKNUT
37. MOUNTING NUT
38. LOCKWASHER
39. TERMINAL BOARD
40. SCREW (SEMS)
41. RESISTOR
42. CAPACITOR
43. SEMICONDUCTOR DEVICE
44. CAPACITOR
45. CAPACITOR
46. CAPACITOR
47. CAPACITOR
48. TERMINAL BOARD
49. SCREW (SEMS)
50. RESISTOR
51. RESISTOR
52. RESISTOR
53. RESISTOR
54. RESISTOR
55. RESISTOR
56. RESISTOR
57. RESISTOR
58. RESISTOR
59. RESISTOR
60. RESISTOR
61. RESISTOR
62. RESISTOR
63. RESISTOR
64. PLATE ASSEMBLY
65. SCREW (SEMS)
66. SEMICONDUCTOR DEVICE
67. RESISTOR
68. RESISTOR
69. RESISTOR
70. CAPACITOR
71. CAPACITOR
72. RESISTOR
73. CAPACITOR
74. SCREW (SEMS)
75. CONNECTOR
76. NUT
77. CONNECTOR
78. NUT
79. EMBLEM
80. NUT
81. WASHER
82. IDENTIFICATION PLATE
83. SCREW
84. CHASSIS ASSEMBLY

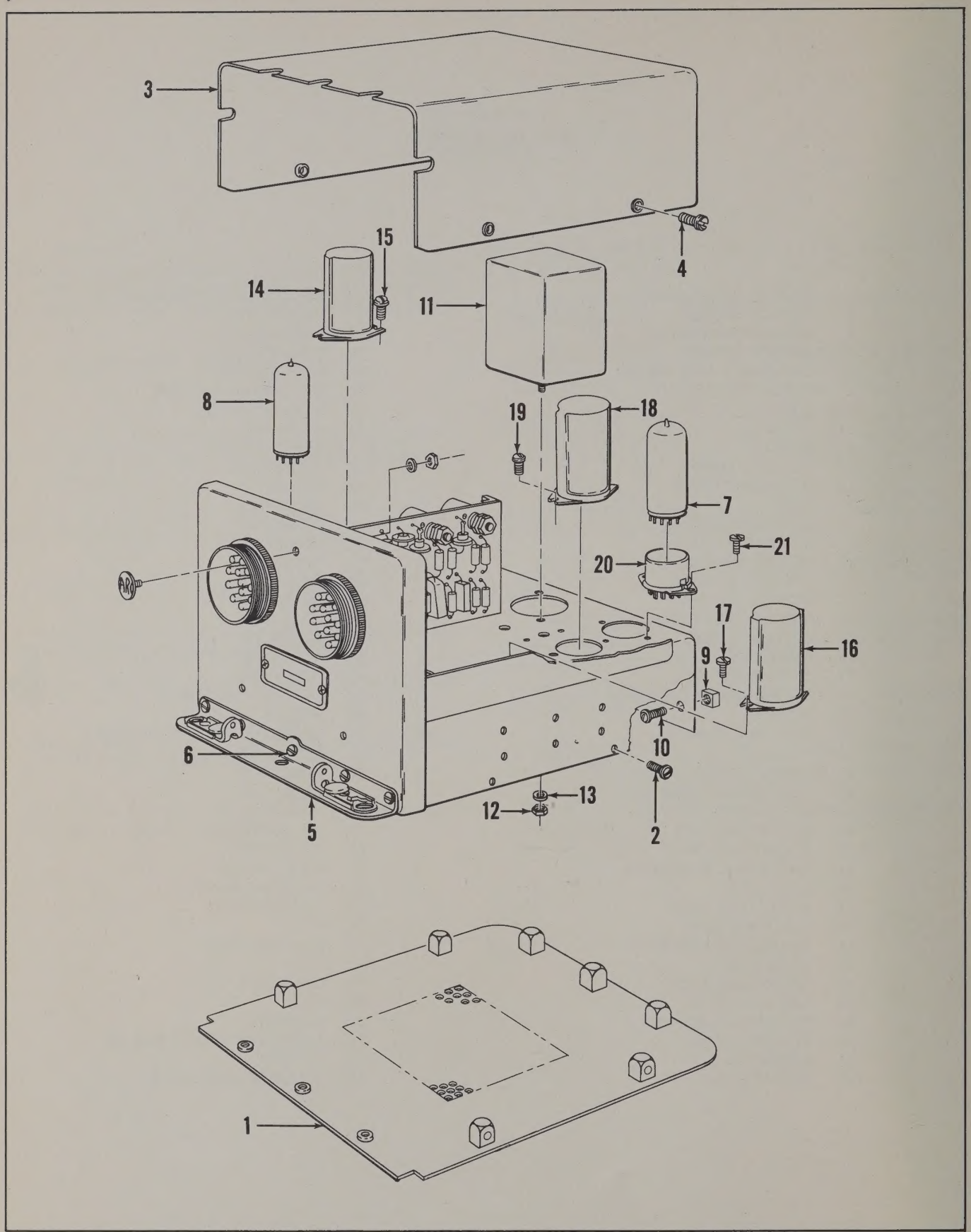


Figure 2-1. ARC Type CA-10A Computer Amplifier Assembly (Sheet 1 of 2) TP 1207 (sheet 1)

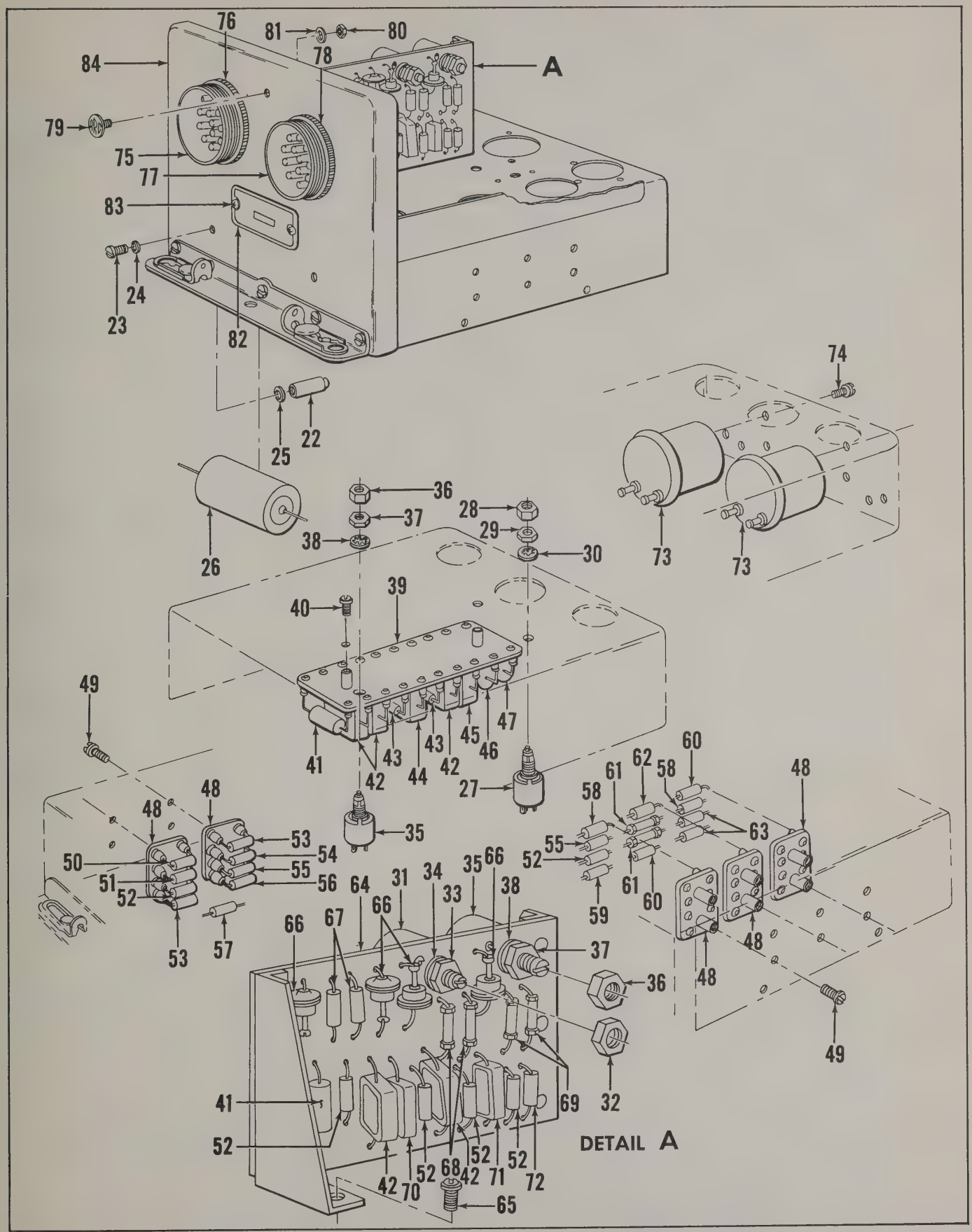


Figure 2-1. ARC Type CA-10A Computer Amplifier Assembly (Sheet 2 of 2) TP 1209 (sheet 2)

SECTION III

CLEANING, INSPECTION, REPAIR, AND REPLACEMENT

3-1. GENERAL.

This section contains instructions for cleaning, inspection, repair, and replacement of the disassembled parts of the ARC Type CA-10A Computer Amplifier. When compressed air is required, use clean dry, oil-free air at 10 to 12 psi. Repair of the disassembled parts of the CA-10A is limited to the instructions listed in Table 3-2.

3-2. CLEANING MATERIALS AND PROTECTIVE AGENTS.

All required cleaning materials and protective agents are listed and identified in Table 3-1.

TABLE 3-1. CLEANING MATERIALS AND PROTECTIVE AGENTS

Material	Mfr and/or Specification
Varsol	Esso Standard Oil Co. (A petroleum naptha of the Stoddard Solvent Class. Solvent, Dry Cleaning, per Federal Specification P-S-661, may also be used.)
Gray Glyptal Enamel	General Electric Co No. 7496, or equivalent.
Nonmetallic Brush	—
Camel's Hair Brush	—
Lintless Cloth	—
Gray Wrinkle Finish	Duralac Chemical Corp. No. 203-L2491 with reducer No. H-1555.

3-3. CLEANING, INSPECTION, REPAIR, AND REPLACEMENT.

Table 3-2 serves as a guide for cleaning, inspection, repair, and replacement.

TABLE 3-2. CLEANING, INSPECTION, REPAIR, AND REPLACEMENT

Part	Cleaning	Inspection	Repair and Replacement
Bracket Assembly (5, Figure 2-1)	Wipe with lintless cloth moistened with Varsol. Dry with compressed air.	Check that snapslides are secure and operate smoothly. Inspect for distortion and enlarged mounting holes.	Replace if defects exist.
Capacitors	Wipe exterior of capacitors (73) with lintless cloth moistened with Varsol. Dry with compressed air. Wipe other capacitors with dry cloth or blow clean with compressed air.	Inspect for severe dents, broken or loose terminals, and cracked insulation.	Replace if defects exist.

TABLE 3-2, CLEANING, INSPECTION, REPAIR, AND REPLACEMENT - Continued

Part	Cleaning	Inspection	Repair and Replacement
Chassis Assembly (84, Figure 2-1)	Blow out accumulated dust and dirt with compressed air; use nonmetallic brush for hard-to-reach surfaces. For grease deposits, use lintless cloth moistened with Varsol.	Inspect for structural defects, enlarged mounting holes, severe dents or other deformation. Check that chassis markings are legible and that painted surfaces are not severely marred or scratched.	Retouch illegible chassis markings. Touch up painted surfaces with Gray Wrinkle Finish, Duralac Chemical Corp. No. 203-L2491. Repair defective spotwelds; replace or tighten broken or loose rivets.
Connectors (75 and 77, Figure 2-1)	Blow out accumulated dust. Dry with compressed air. Clean threads with nonmetallic brush.	Inspect for bent, broken or loose pins, cracked insulation, and damaged or worn threads.	Replace if defects exist.
Cover Assembly (1, Figure 2-1)	Wipe with lintless cloth moistened with Varsol. Dry with compressed air.	Inspect for deformation. Check that mounting studs are secure, with no broken or stripped threads.	Tighten rivets of loosened mounting studs. Replace if severely damaged.
Electron Tubes (7 and 8, Figure 2-1)	Wipe with dry cloth.	Inspect for bent pins, and broken or cracked glass envelopes. Check with tube tester.	Replace defective tubes.
Resistors (fixed)	None	Inspect for broken leads and evidence of overheating.	Replace if defective.
Resistors (variable)	Wipe with lintless cloth moistened with Varsol. Dry with compressed air.	Inspect for damage, rough rotation of shaft, and loose or broken terminals.	Replace if defects exist.
Screws and Nuts	Immerse in Varsol, use nonmetallic brush to loosen hardened grease and dirt. Dry with compressed air.	Inspect for worn or damaged threads.	Replace if threads are worn or damaged.
Shield Assembly (3, Figure 2-1)	Blow or brush out accumulated dust. Use lintless cloth moistened with Varsol to remove grease deposits.	Inspect for severe dents or other structural damage, damaged mounting hole inserts, marred or badly scratched painted surfaces.	Touch up outside painted surface with Gray Wrinkle Finish, Duralac Chemical Corp. No. 203-L2491. Replace if severely damaged.
Sockets (20, Figure 2-1)	Blow or brush out accumulated dust. Wipe terminals with lintless cloth moistened with Varsol. Dry with compressed air.	Inspect terminals for secure attachment and freedom from corrosion. Check base for cracks and secure attachment to saddle. Inspect saddle for enlarged mounting holes.	Replace if defects exist.
Terminal Boards (39 and 48, Figure 2-1)	Remove dust with brush or dry, lintless cloth.	Inspect for broken, cracked, or chipped ceramic plates. Inspect for loose or broken terminals.	Replace if defects exist.
Transformers	None	Inspect for swelled case and loose or broken terminals.	Replace if defects exist.

SECTION IV

REASSEMBLY

4-1. GENERAL.

This section contains instructions for the reassembly of the ARC Type CA-10A Computer Amplifier. Instructions are included for lubrication required during reassembly. A wiring diagram is shown in Figure 4-1.

4-2. REASSEMBLY. (See Figure 2-1.)

Step 1. Insert emblem (79) through front of chassis assembly (84) and secure washer (81) and nut (80). Seal nut (80) with gray glyptal enamel, General Electric Co. No. 7496, or equivalent.

Step 2. Insert connectors (75) and (77) through front of chassis assembly (84) and secure with nuts (76) and (78). Seal nuts (76) and (78) with gray glyptal enamel, General Electric Co. 7496, or equivalent.

Step 3. Position two capacitors (73) on chassis assembly (84) and secure with four screws (74).

Step 4. Install plate assembly (64) with screws (65). Solder any resistors, capacitors, or semiconductor devices that were removed.

Step 5. Install five terminal boards (48) with screws (49). Solder any resistors that were removed.

Step 6. Install terminal board (39) with screws (40). Solder any resistor, capacitors, or semiconductor devices that were removed.

Step 7. Position variable resistors (27), (31), and (35) and secure with lockwashers (30), (34), and (38), mounting nuts (29), (33), and (37), and locknuts (28), (32), and (36).

Step 8. Secure insulator assemblies (22) with washers (24) and (25), and screws (24). Solder capacitor (26) to insulator assemblies (22).

Step 9. Position four sockets (20) on chassis assembly (84) and secure with eight screws (21).

Step 10. Place transformers (14), (16), and (18) on chassis assembly (84) and secure with screws (15), (17), and (19).

Step 11. Install transformer (11) with lockwashers (13) and nuts (12).

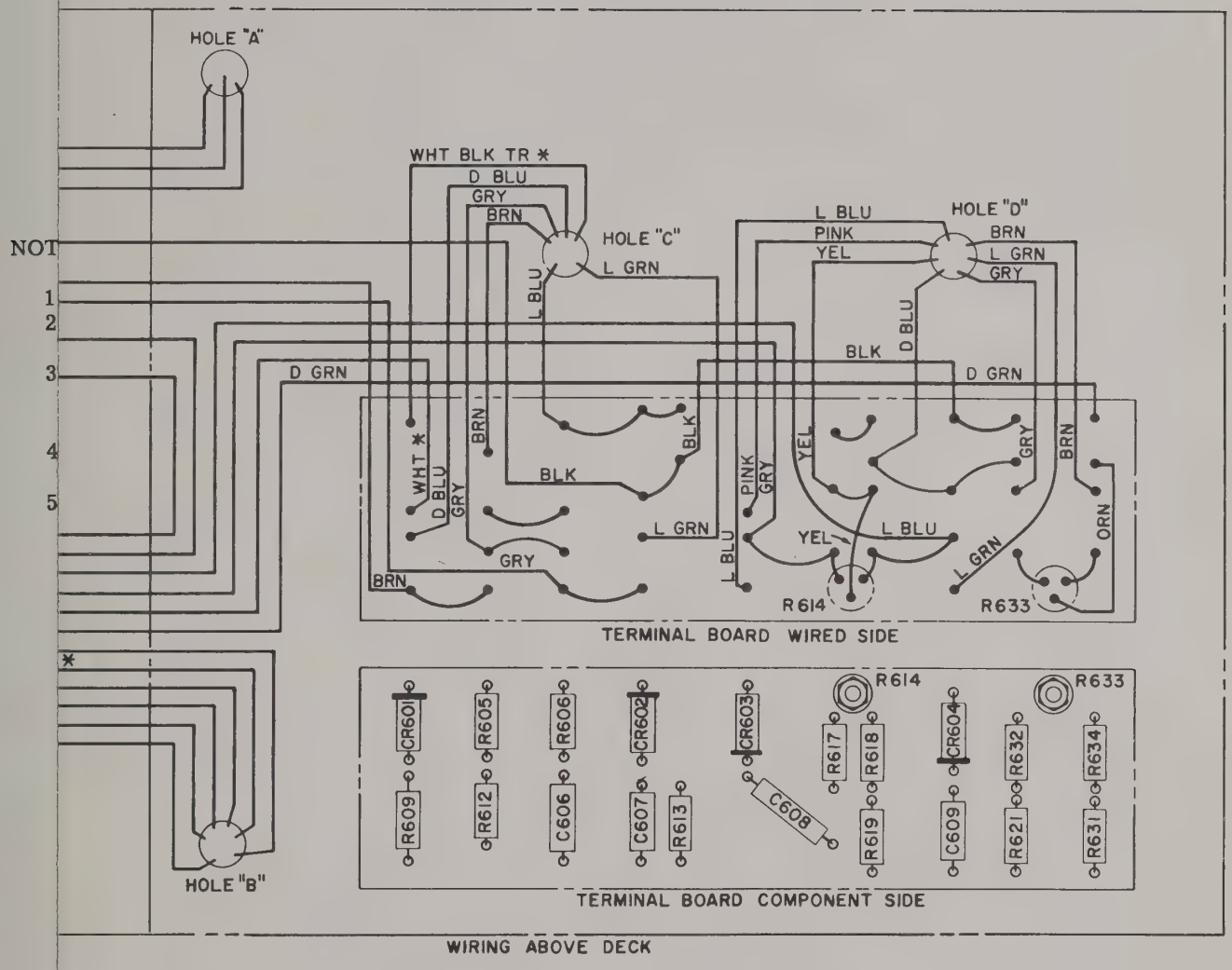
Step 12. Place insert (9) on back of chassis assembly (84) and secure with screw (10).

Step 13. Insert tubes (7) and (8) into sockets (20).

Step 14. Position bracket assembly (5) on front of chassis assembly (84) and secure with five screws (6).

Step 15. Place shield assembly (3) on chassis assembly (84) and secure with four screws (4).

Step 16. Place cover assembly (1) on chassis assembly (84) and secure with 10 screws (2).



18321D

Figure 4—1. ARC Type CA-10A Computer Amplifier, Wiring Diagram

SECTION IV

REASSEMBLY

4-1. GENERAL.

This section contains instructions for the reassembly of the ARC Type CA-10A Computer Amplifier. Instructions are included for lubrication required during reassembly. A wiring diagram is shown in Figure 4-1.

4-2. REASSEMBLY. (See Figure 2-1.)

Step 1. Insert emblem (79) through front of chassis assembly (84) and secure washer (81) and nut (80). Seal nut (80) with gray glyptal enamel, General Electric Co. No. 7496, or equivalent.

Step 2. Insert connectors (75) and (77) through front of chassis assembly (84) and secure with nuts (76) and (78). Seal nuts (76) and (78) with gray glyptal enamel, General Electric Co. 7496, or equivalent.

Step 3. Position two capacitors (73) on chassis assembly (84) and secure with four screws (74).

Step 4. Install plate assembly (64) with screws (65). Solder any resistors, capacitors, or semiconductor devices that were removed.

Step 5. Install five terminal boards (48) with screws (49). Solder any resistors that were removed.

Step 6. Install terminal board (39) with screws (40). Solder any resistor, capacitors, or semiconductor devices that were removed.

Step 7. Position variable resistors (27), (31), and (35) and secure with lockwashers (30), (34), and (38), mounting nuts (29), (33), and (37), and locknuts (28), (32), and (36).

Step 8. Secure insulator assemblies (22) with washers (24) and (25), and screws (24). Solder capacitor (26) to insulator assemblies (22).

Step 9. Position four sockets (20) on chassis assembly (84) and secure with eight screws (21).

Step 10. Place transformers (14), (16), and (18) on chassis assembly (84) and secure with screws (15), (17), and (19).

Step 11. Install transformer (11) with lockwashers (13) and nuts (12).

Step 12. Place insert (9) on back of chassis assembly (84) and secure with screw (10).

Step 13. Insert tubes (7) and (8) into sockets (20).

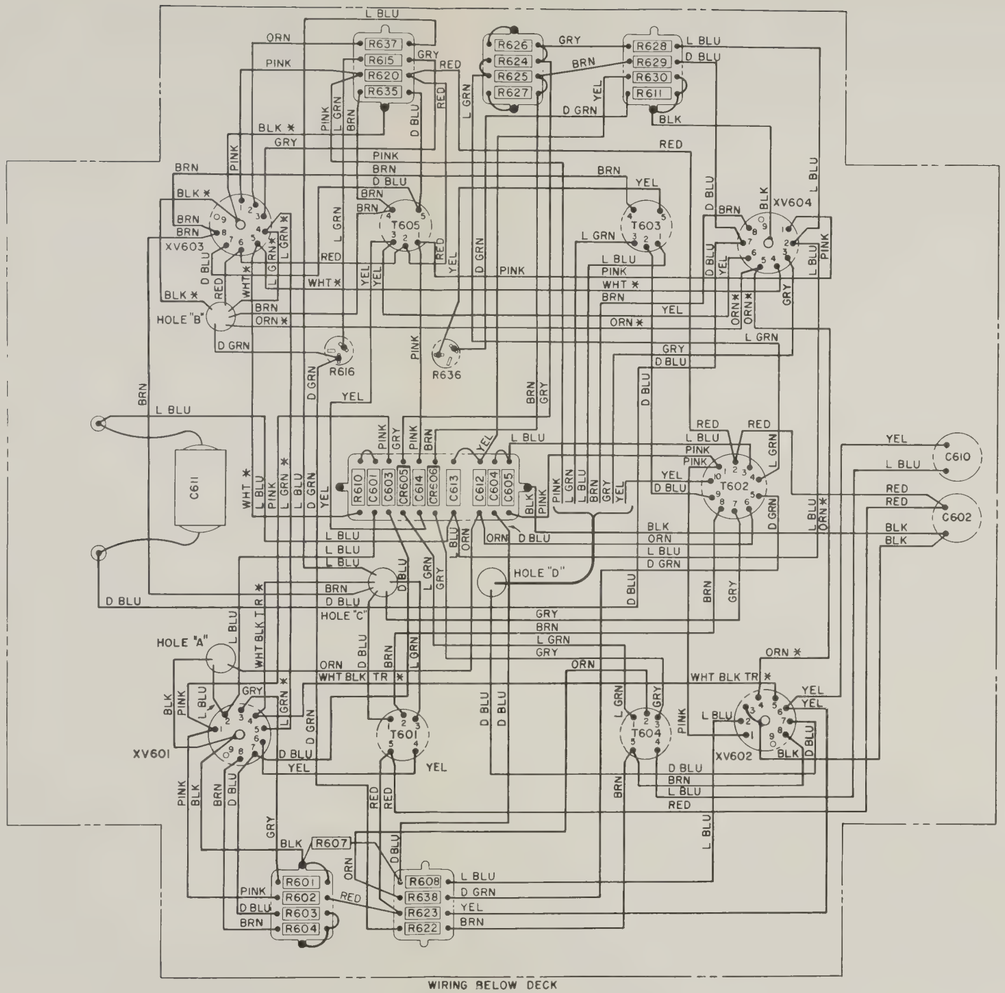
Step 14. Position bracket assembly (5) on front of chassis assembly (84) and secure with five screws (6).

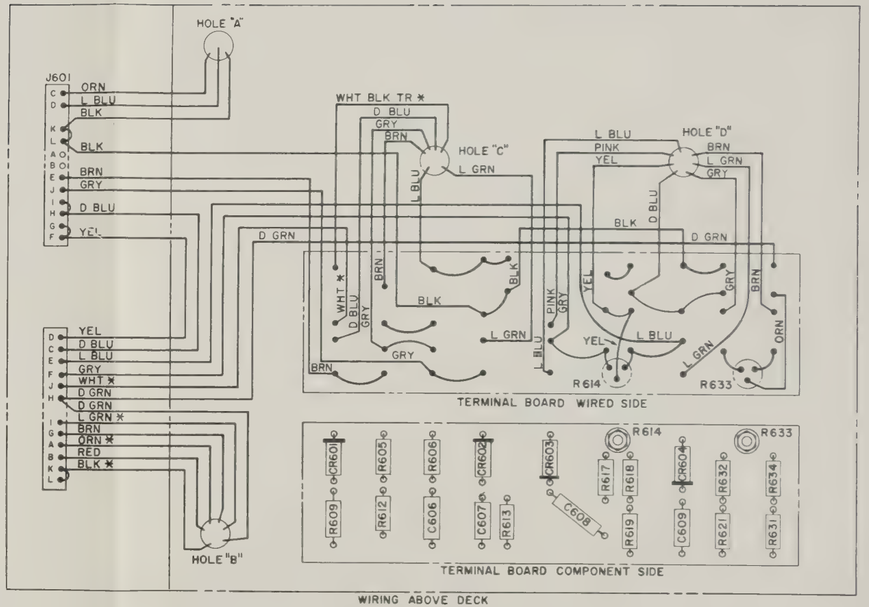
Step 15. Place shield assembly (3) on chassis assembly (84) and secure with four screws (4).

Step 16. Place cover assembly (1) on chassis assembly (84) and secure with 10 screws (2).

NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 6-3.
2. WIRES MARKED WITH COLOR NOTE ARE NO. 24 SOLID COPPER, VINYLITE INSULATED.
3. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE NO. 22 SOLID, TINNED COPPER, VINYLITE INSULATED.
4. UNMARKED WIRES ARE NO. 22 SOLID, TINNED COPPER.
5. SHADED ENDS OF CRYSTAL RECTIFIERS CR601 THROUGH CR606 INDICATE CATHODE END.





18321D

Figure 4—1. ARC Type CA-10A Computer Amplifier, Wiring Diagram

SECTION V

TESTING

5-1. GENERAL.

This section contains instructions for testing the ARC Type CA-10A Computer Amplifier upon completion of reassembly.

5-2. SPECIAL EQUIPMENT.

The special equipment listed in Table 5-1, or its equivalent, is required to adjust and test the CA-10A.

TABLE 5-1. SPECIAL EQUIPMENT

Equipment	Manufacturer	Type
Bench Test Kit	Aircraft Radio Corp.	BTK-17
Audio Oscillator	Hewlett-Packard	Model 200B
Voltmeter	Ballantine	Model 300
Multimeter	Simpson	Model 260
Stop Watch	—	—

5-3. PRELIMINARY PROCEDURE.

Step 1. Interconnect the CA-10A and ARC Type H-17 Test Unit with Cable Harness Assembly ARC-18876.

Note

Do not connect any other components to the cable harness assembly.

Step 2. Connect 115-volt, 60-cycle primary power to H-17 using Cable Assembly ARC-14701.

Step 3. Set the H-17 switches as follows: HDG SYN to INT, COMP XMTR to INT, 60 ~ VOLTAGE to NORM, METER SCALE to 450, and 60 ~ ON-OFF to ON. Allow equipment to warm up to 5 to 10 minutes.

Step 4. Connect multimeter, set on 300-volt d-c range, to HV and GND test jacks.

Step 5. Using the INCR LV switch, set the H-17 high voltage for approximately 295 volts dc. (Leave multimeter connected to monitor high voltage during test.)

Note

The H-17 checks the CA-10A for 28-volt operation only; continuity of 14-volt heater wiring may be checked with an ohmmeter.

5-4. TESTING.

A summary of test limits is given in Table 5-3.

Oscillator Test.

Step 1. Connect voltmeter to OSC and GND test jacks. Voltmeter should indicate between 30 and 36 volts.

Step 2. Remove voltmeter from OSC and GND test jacks.

Step 3. Set the COMP XMTR switch to EXT position.

Step 4. Connect output of the audio oscillator to COMP and GND test jacks.

Step 5. Adjust audio oscillator output at approximately 1350 cps to about 2 volts.

Step 6. Observing the GYRO SLAVING meter, carefully vary the frequency of the audio oscillator in the vicinity of 1350 cps. A region will be observed where the GYRO SLAVING meter will follow the beat frequency; at the center of this region, the internal and external oscillators are synchronized. At the synchronization point, the frequency should be between 1250 and 1450 cps.

Step 7. Disconnect the audio oscillator.

Step 8. Set the COMP XMTR switch to INT position.

Gyro Slaving Amplifier Test.

Step 1. Connect voltmeter to the COMP and GND test jacks.

Step 2. Set the HDG SYN instrument in the vicinity of zero degrees by adjusting its control to obtain a null indication on the voltmeter.

Step 3. Short the COMP test jack to ground. The GYRO SLAVING meter should indicate between -0.5 to +0.5 ma.

Note

Negative current value refers to leftward needle deflection; positive value to rightward needle deflection.

Step 4. Set the HDG SYN instrument for a 10-degree reading. The GYRO SLAVING meter should indicate -6.0 to -11.0 ma.

Step 5. Set the HDG SYN instrument for a 350-degree reading. The GYRO SLAVING meter should indicate +6.0 to + 11.0 ma.

Note

Current readings obtained in Steps 4 and 5 must be within 2.0 ma of each other.

Step 6. Set the HDG SYN instrument for a 2-degree reading. The GYRO SLAVING meter reading must be within 1.2 ma of that obtained in Step 4.

Step 7. Set the HDG SYN instrument for a 358-degree reading. The GYRO SLAVING meter reading must be within 1.2 ma of that obtained in Step 5.

Heading Bridge Test and Adjustment.

Step 1. Connect voltmeter to COMP and GND test jacks.

Step 2. Set the HDG SYN instrument in the vicinity of zero degrees by adjusting its control to obtain a null indication on the voltmeter.

Step 3. Set the DIRECTOR CONTROL switch to MAG HDG position.

Step 4. Remove voltmeter from COMP and GND test jacks and connect to HDG and GND test jacks to indicate heading signal.

Step 5. Set the DIRECTOR CONTROL pointer in the vicinity of zero degrees to obtain a null indication on the voltmeter.

Step 6. Set the METER SCALE switch to 30 and read deviation current on the DEVIATION MICROAMPERS meter. If this reading is not 0(±0.5) ua, adjust R614 in the CA-10A to obtain this reading.

Step 7. Set the METER SCALE switch to 150 position and adjust the DIRECTOR CONTROL pointer to produce -150 ua and then + 150 ua on the DEVIATION MICROAMPERES meter. For -150 ua reading, the pointer should indicate between 342 and 347 degrees. For + 150 ua reading, the pointer should indicate between 13 and 18 degrees. The sum of the two settings should be between 358.5 and 361.5 degrees.

Note

If the values obtained in Step 7 are not within the specified limits, proceed with the heading computer test and adjustment and then repeat Step 7 of this procedure.

Heading Computer Test and Adjustment.

Step 1. Connect voltmeter to COMP and GND test jacks.

Step 2. Set the HDG SYN instrument in the vicinity of zero degrees by adjusting its control to obtain a null indication on the voltmeter.

Step 3. Set the DIRECTOR CONTROL switch to OMNI LOC BLUE RIGHT position.

Step 4. Remove voltmeter from COMP and GND test jacks and connect it to HDG and GND test jacks.

Step 5. Set the DIRECTOR CONTROL pointer knob in the vicinity of zero degrees to obtain a null indication on the voltmeter.

Step 6. Set the DIRECTOR CONTROL pointer knob to each of the angles listed in Table 5-2.

Step 7. Read and record the deviation current on the DEVIATION MICROAMPERES meter after it becomes stabilized.

TABLE 5-2. HEADING COMPUTER TEST LIMITS

DIRECTOR CONTROL Setting (degrees)	METER SCALE Set to:	Deviation Current (Microamperes)
0	30	-1.5 to +1.5
5	30	+5 to +10
*18	30	+25 to +30
90	450	+300 to +345
270	450	-325 to -400
*342	30	-25 to -30
355	30	-5 to -10

*The magnitudes of the 18-degree and 342-degree currents must be within 5 ua of each other.

Note

If desired, the time required for the deviation current reading to stabilize may be decreased by replacing C611 (8 uf) of the CA-10A with a 0.25 uf capacitor.

Step 8. If the deviation current is not within the limits listed in Table 5-2, perform Steps 9 through 13.

Step 9. Adjust R633 of the CA-10A for equal and opposite deviation current at DIRECTOR CONTROL settings of 18 and 342 degrees.

Step 10. Set the DIRECTOR CONTROL to 18 degrees, and adjust R616 of the CA-10A for a reading as close as posible to + 27 ua.

Step 11. Readjust R633 and R616 as required to balance the 18 and 342-degree current within 2 ua, and as close as possible to + 27 ua and -27 ua, respectively.

Step 12. Set METER SCALE switch to 450. Set the DIRECTOR CONTROL to 90 degrees and adjust R636 of the CA-10A for a current reading as close as possible to + 325 ua.

Note

This will be read on the DEVIATION MICROAMPERES meter (150-microampere scale) as 108 ua.

Step 13. Repeat Steps 9 and 10; then lock all potentiometers, being careful not to disturb their settings.

Note

Reinstall capacitor C611 (8 uf) if it was replaced temporarily by a 0.25 uf capacitor.

Step 14. Set the DIRECTOR CONTROL to 18 degrees.

Step 15. Place the 60 ~ VOLTAGE switch in the TEST position and note the change in deviation current. The current should not vary more than ± 7.0 ua. Reset the 60 ~ VOLTAGE switch to NORM position.

Step 16. Set the METER SCALE switch to 150 position, the DIRECTOR CONTROL switch to OMNI LOC BLUE RIGHT position and its pointer to 18 degrees, and the HDG SYN switch to EXT position.

Step 17. About 1 minute after performing Step 16, set the HDG SYN switch to INT position. Note the initial (disregard needle overswing) and stabilized values of deviation current indicated on the DEVIATION MICROAMPERES meter.

Step 18. Calculate 63 percent of the difference between the two readings. Subtract the results from the initial current reading.

Step 19. Reset HDG SYN switch to EXT position. After about 1 minute, set HDG SYN switch to INT position and using a stop watch, measure the "time constant" as the time required for the deviation current to decay to the value obtained in Step 18.

Step 20. Set DIRECTOR CONTROL pointer to 342 degrees and repeat Steps 17, 18, and 19. At either director control setting, the "time constant" must be between 7 and 13 seconds.

TABLE 5-3. SUMMARY OF TEST LIMITS

Test	Limits
Oscillator	28 to 35 volts ac
Gyro Slaving Amplifier	0° Current: - 0.5 to + 0.5 ma 10° Current: - 6.0 to - 11.0 ma 350° Current: + 6.0 to +11.0 ma 2° and 358° Current: Within 1.2 ma of 10° and 350° Currents
Heading Bridge	Deviation Current: 0 (±0.5) ua -150 ua setting: 342 to 347 degrees +150 ua setting: 13 to 18 degrees Sum of -150 ua and +150 ua settings: 358.5 to 361.5 degrees
Heading Computer	Deviation Current: 0° -1.5 to + 1.5ua 5° + 5 to + 10 ua 18° + 25 to + 30 ua 90° + 300 to + 345 ua 270° -325 to - 400 ua 342° - 25 to - 30 ua 355° - 5 to -10 ua Note: 18-and 342-degree currents must be within 5 ua of each other. 18° Time Constant: 7 to 13 seconds 342° Time Constant: 7 to 13 seconds

TABLE 5-2. HEADING COMPUTER TEST LIMITS

DIRECTOR CONTROL Setting (degrees)	METER SCALE Set to:	Deviation Current (Microamperes)
0	30	-1.5 to +1.5
5	30	+5 to +10
*18	30	+25 to +30
90	450	+300 to +345
270	450	-325 to -400
*342	30	-25 to -30
355	30	-5 to -10

*The magnitudes of the 18-degree and 342-degree currents must be within 5 ua of each other.

Note

If desired, the time required for the deviation current reading to stabilize may be decreased by replacing C611 (8 uf) of the CA-10A with a 0.25 uf capacitor.

Step 8. If the deviation current is not within the limits listed in Table 5-2, perform Steps 9 through 13.

Step 9. Adjust R633 of the CA-10A for equal and opposite deviation current at DIRECTOR CONTROL settings of 18 and 342 degrees.

Step 10. Set the DIRECTOR CONTROL to 18 degrees, and adjust R616 of the CA-10A for a reading as close as posible to + 27 ua.

Step 11. Readjust R633 and R616 as required to balance the 18 and 342-degree current within 2 ua, and as close as possible to + 27 ua and -27 ua, respectively.

Step 12. Set METER SCALE switch to 450. Set the DIRECTOR CONTROL to 90 degrees and adjust R636 of the CA-10A for a current reading as close as possible to + 325 ua.

Note

This will be read on the DEVIATION MICROAMPERES meter (150-microampere scale) as 108 ua.

Step 13. Repeat Steps 9 and 10; then lock all potentiometers, being careful not to disturb their settings.

Note

Reinstall capacitor C611 (8 uf) if it was replaced temporarily by a 0.25 uf capacitor.

Step 14. Set the DIRECTOR CONTROL to 18 degrees.

Step 15. Place the 60 ~ VOLTAGE switch in the TEST position and note the change in deviation current. The current should not vary more than ± 7.0 ua. Reset the 60 ~ VOLTAGE switch to NORM position.

Step 16. Set the METER SCALE switch to 150 position, the DIRECTOR CONTROL switch to OMNI LOC BLUE RIGHT position and its pointer to 18 degrees, and the HDG SYN switch to EXT position.

Step 17. About 1 minute after performing Step 16, set the HDG SYN switch to INT position. Note the initial (disregard needle overswing) and stabilized values of deviation current indicated on the DEVIATION MICROAMPERES meter.

Step 18. Calculate 63 percent of the difference between the two readings. Subtract the results from the initial current reading.

Step 19. Reset HDG SYN switch to EXT position. After about 1 minute, set HDG SYN switch to INT position and using a stop watch, measure the "time constant" as the time required for the deviation current to decay to the value obtained in Step 18.

Step 20. Set DIRECTOR CONTROL pointer to 342 degrees and repeat Steps 17, 18, and 19. At either director control setting, the "time constant" must be between 7 and 13 seconds.

TABLE 5-3. SUMMARY OF TEST LIMITS

Test	Limits
Oscillator	28 to 35 volts ac
Gyro Slaving Amplifier	0° Current: - 0.5 to + 0.5 ma 10° Current: - 6.0 to - 11.0 ma 350° Current: + 6.0 to +11.0 ma 2° and 358° Current: Within 1.2 ma of 10° and 350° Currents
Heading Bridge	Deviation Current: 0 (±0.5) ua -150 ua setting: 342 to 347 degrees +150 ua setting: 13 to 18 degrees Sum of -150 ua and +150 ua settings: 358.5 to 361.5 degrees
Heading Computer	Deviation Current: 0° -1.5 to + 1.5ua 5° + 5 to + 10 ua 18° + 25 to + 30 ua 90° + 300 to + 345 ua 270° -325 to - 400 ua 342° - 25 to - 30 ua 355° - 5 to -10 ua Note: 18-and 342-degree currents must be within 5 ua of each other. 18° Time Constant: 7 to 13 seconds 342° Time Constant: 7 to 13 seconds

Parts Catalog

for

ARC TYPE CA-10A

COMPUTER AMPLIFIER

CONTENTS

Section		Page
I	GENERAL INFORMATION	1
II	PARTS LIST	3
III	NUMERICAL INDEX	10
IV	REFERENCE DESIGNATION INDEX	11

SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.
This book provides parts information for the ARC Type CA-10A Computer Amplifier (Figure 1), manufactured by Aircraft Radio Corporation, Boonton, New Jersey. Included are instructions for using the Parts Catalog, an exploded view showing assembly and disassembly relationship, a parts list, a numerical index, and a reference designation index.

1-2. PARTS LIST.
The Parts List, Section II, consists of a breakdown of the CA-10A into assemblies, subassemblies, and detail parts. Each assembly is listed in its order of disassembly and is followed by its detail parts properly indented below, except where reference is made to other illustrations. Items which are made from bulk stock, such as cut lengths of wire, are not included in the Parts List.

In the figure and index number column, the digit preceding the hyphen refers to the corresponding illustration. The digits following the hyphen are the index numbers of parts and assemblies. The index numbers are numerically arranged in the Parts List and are used primarily to assist in locating a part in the Parts List when the part number has been located in the Numerical Index. The index numbers also assist in locating the part on the referenced illustration.

The ARC part number column contains the Aircraft Radio Corporation assigned part number for the indexed item. If an ARC part number has not been assigned, the symbol " - " appears in the part number column. Codes and part numbers of manufacturers other than ARC are included in parentheses in the description column.

The description column lists each assembly, and its detail parts properly indented to show their relationship to the assembly. Attaching parts are listed in the same column immediately following the parts they attach. The symbol " - - - * - - - " indicates the completion of the attaching parts for an assembly or part. A reference to a figure and index number in the description column refers to a separate illustration and listing in which the detail parts are shown, or to

TP 1078

Figure 1. ARC Type CA-10A Computer Amplifier

an illustration on which the part is shown as an assembled item.

Except for attaching parts, the quantities listed in the units-per-assembly column are the quantities per assembly, per subassembly, etc. The quantities specified, therefore, are not necessarily the total for the CA-10A. Refer to the Numerical Index, Section III, for total quantities. The letters "AR" denote that the quantity used is "as required." "Ref" indicates an assembly which was previously removed and accounted for.

1-3. MANUFACTURERS' CODE.
The following is a list of manufacturers' codes, and the corresponding names and addresses, which are referenced in this Parts Catalog.

CODE	NAME AND ADDRESS
AB	ALLEN-BRADLEY CO Milwaukee, Wisconsin
CIN	CINCH MFG CO Chicago, Illinois
IRC	INTERNATIONAL RESISTANCE CO Philadelphia, Pennsylvania
HAEZ	HOPKINS ENGINEERING CORP Altadena, California
PK	PARKER-KALON CORP New York, New York
SH	SHAKEPROOF INC DIV ILLINOIS TOOL WORKS Chicago, Illinois

1-4. NUMERICAL INDEX.
The part number column of the Numerical Index lists all part numbers included in the Parts List, Section II, and is compiled in accordance with the following alphabetical-numerical system.

Part number arrangement starts at the left and continues from left to right, one column at a time, until part number position in the Numerical Index is determined. Beginning with the first column, the order of precedence to determine the part number position is as follows:

(1) Letters A through Z.

(2) Numerals 0 through 9.

Continuing with the second and succeeding columns, the order of precedence to determine the part number position is as follows:

(1) Space (blank column).

(2) Diagonal (slant) /.

(3) Point (period).

(4) Dash (-).

(5) Parentheses ( ).

(6) Letters A through Z.

(7) Numerals 0 through 9.

Alphabetical O's are considered as numerical zeroes. Parts which have neither an ARC nor a manufacturer's part number are listed by item name.

In the figure and index number column, the digits preceding the dash refer to the figure in the Parts List, Section II, on which the assemblies or parts are illustrated. The digits following the dash are the index numbers of the parts or assemblies.

The total quantity column lists the total quantity of assemblies or parts for the CA-10A. The letters "AR" indicate that the quantities used are indeterminate (as required) and no definite quantity can be shown.

1-5. REFERENCE DESIGNATION INDEX.
The Reference Designation Index, Section IV, lists reference designations which have been assigned to parts of the CA-10A. The reference designation column lists the reference designations in alphabetical-numerical sequence. All reference designations used in illustrations and publications pertaining to the CA-10A are listed. The figure and index number column is used to locate the part in the Parts List. The part number column lists the part numbers of those parts which have been assigned reference designations.

1-6. HOW TO USE THIS PARTS CATALOG.
When a part number is known and it is desired to locate and identify the part, refer to the Numerical Index, Section III. Using the alphabetical-numerical arrangement, locate the part number. Note the figure and index number opposite the part number. Refer to the referenced figure and index number in the Parts List, Section II.

When the location and appearance of a part is known and it is desired to determine its part number and description, refer to the Table of Contents of the Parts Catalog for the page number of the major assembly which illustrates the desired part. Then refer to the Parts List, Section II, and identify the part on the illustration by its index number. The part number and description will be found immediately opposite the figure and index number in the parts list for the illustration.

SECTION II

PARTS LIST

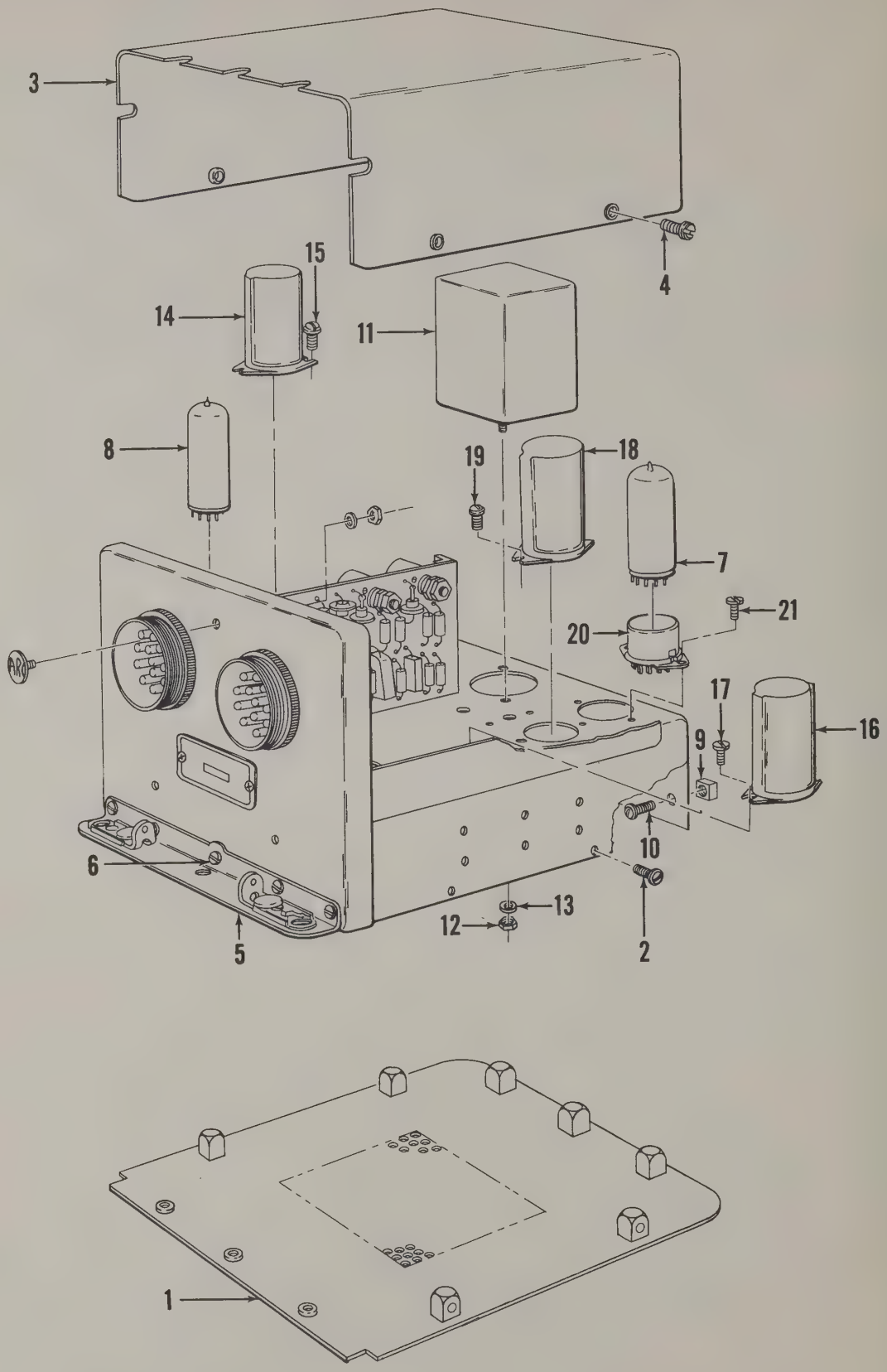


Figure 2. ARC Type CA-10A Computer Amplifier Assembly (Sheet 1 of 2) TP 1207 (sheet 1)

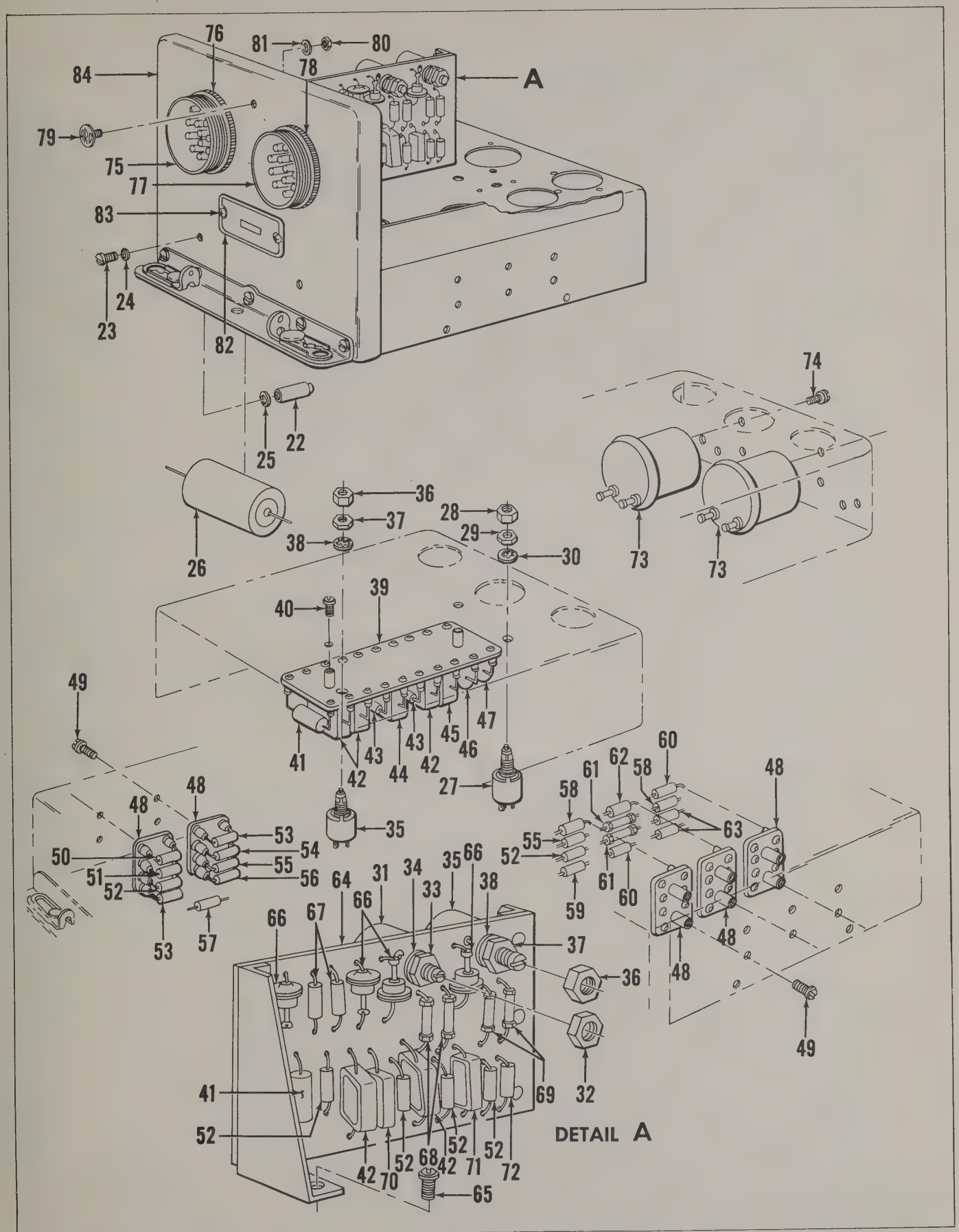


Figure 2. ARC Type CA-10A Computer Amplifier Assembly (Sheet 2 of 2) TP 1209 (sheet 2)

Figure & Index No.	ARC Part No.	1 2 3 4 5 6 Description	Units per Assy
2-	18320	COMPUTER AMPLIFIER ASSY	1
-1	20049	. COVER ASSY, Bottom	1
		(ATTACHING PARTS)	
-2	513(3/16)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, black oxidized, 3-48 thd by 3/16 in. long (SH) (SEMS)	10
		- - - * - - -	
-3	18352	. SHIELD ASSY	1
		(ATTACHING PARTS)	
-4	513(3/16)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, black oxidized, 3-48 thd by 3/16 in. long (SH) (SEMS)	4
		- - - * - - -	
-5	12155	. BRACKET ASSY, Mounting	1
		(ATTACHING PARTS)	
-6	503(1/4)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 1/4 in. long (SH) (SEMS)	5
		- - - * - - -	
-7	-	. ELECTRON TUBE, Type 5814A	2
-8	-	. ELECTRON TUBE, Type 12AT7WA	2
-9	11839	. INSERT	2
		(ATTACHING PARTS)	
-10	504(3/16)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 4-40 thd by 3/16 in. long (SH) (SEMS)	2
		- - - * - - -	
-11	18763	. TRANSFORMER, Oscillator (COLIN CAMPBELL) (L1882A)	1
		(ATTACHING PARTS)	
-12	4041	. NUT, Machined, Hex, brass, double chamfered; 6-32 thd (Class 2 fit) by 0.250 wide by 0.078 ± 0.005 thick; nickel plated	2
-13	8488	. WASHER, Lock, internal teeth, stainless steel, No. 6, 0.145 ID by 0.280 OD by 0.018 in. thick (SH) (1706)	2
		- - - * - - -	
-14	18762	. TRANSFORMER, Slaving (COLIN CAMPBELL) (L-1913)	1
		(ATTACHING PARTS)	
-15	503(3/16)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 3/16 in. long (SH) (SEMS)	2
		- - - * - - -	
-16	18761	. TRANSFORMER, Audio frequency (COLIN CAMPBELL) (L-1909)	2
		(ATTACHING PARTS)	
-17	503(3/16)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 3/16 in. long (SH) (SEMS)	4
		- - - * - - -	
-18	18760	. TRANSFORMER, Heading (COLIN CAMPBELL) (L-1910)	1
		(ATTACHING PARTS)	
-19	503(3/16)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 3/16 in. long (SH) (SEMS)	2
		- - - * - - -	
-20	15230	. SOCKET, Electron tube (CIN) (53F13381)	4
		(ATTACHING PARTS)	
-21	503(5/32)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 5/32 in. long (SH) (SEMS)	8
-22	14556	. . INSULATOR ASSY	2

Figure & Index No.	ARC Part No.	1 2 3 4 5 6 Description	Units per Assy
		(ATTACHING PARTS)	
2-23	103(7/32)	. . SCREW, Machine, binding head, brass, nickel plated, 3-48 thd by 7/32 in. long	2
-24	10353	. . WASHER, Formed	2
-25	12924	. . WASHER, Rubber	2
		- - - * - - -	
-26	8785	. CAPACITOR, Fixed, paper, 8 microfarads ± 20 percent, 200 volts dc working (HAEZ) (8P2H)	1
-27	8737	. RESISTOR, Variable, composition, 2500 ohms ± 20 percent, 0.33 watt (AB) (GLU2522SD3028L)	1
		(ATTACHING PARTS)	
-28	-	. NUT, Lock (AB)(M-4761) (supplied with 27, figure 2)	1
-29	-	. NUT, Mounting (AB) (M-4721) (supplied with 27, figure 2)	1
-30	-	. WASHER, Lock (AB) (M-4748) (supplied with 27, figure 2)	1
		- - - * - - -	
-31	8665	. RESISTOR,Variable, composition, 5000 ohms ± 20 percent, 0.33 watt (AB) (GLU5022SD3028L)	1
		(ATTACHING PARTS)	
-32	-	. NUT, Lock (AB)(M-4761) (supplied with 31, figure 2)	1
-33	-	. NUT, Mounting (AB) (M-4721) (supplied with 31, figure 2)	1
-34	-	. WASHER, Lock (AB) (M-4748) (supplied with 31, figure 2)	1
		- - - * - - -	
-35	8736	. RESISTOR, Variable, composition, 1000 ohms ± 20 percent, 0.33 watt (AB) (GLU1022SD3028L)	2
		(ATTACHING PARTS)	
-36	-	. NUT, Lock (AB) (M-4761) (supplied with 35, figure 2)	2
-37	-	. NUT, Mounting (AB) (M-4721) (supplied with 35, figure 2)	2
-38	-	. WASHER, Lock (AB) (M-4748) (supplied with 35, figure 2)	2
		- - - * - - -	
-39	14079	. TERMINAL BOARD	1
		(ATTACHING PARTS)	
-40	503(5/32)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 5/32 in. long (SH) (SEMS)	2
		- - - * - - -	
-41	8735(3.3)	. RESISTOR, Fixed, composition, 3.3 ohms ± 10 percent, 1 watt (AB) (GB3R31)	2
-42	8618(10000)	. CAPACITOR, Fixed, mica, 10,000 micromicrofarads ± 2 percent, 500 volts dc working (CM35E103G) (Spec MIL-C-5)	5
-43	17953	. SEMICONDUCTOR DEVICE, Diode, Type 1N459	2
-44	8617(510)	. CAPACITOR, Fixed, mica, 510 micromicrofarads ± 2 percent, 500 volts dc working (CM20DE511G) (Spec MIL-C-5)	1
-45	8618(4700)	. CAPACITOR, Fixed, mica, 4700 micromicrofarads ± 2 percent, 500 volts dc working (CM35E472G) (Spec MIL-C-5)	1
-46	8747	. CAPACITOR, Fixed, paper, 47,000 micromicrofarads ± 5 percent, 400 volts dc working (CLD) (TWM 4S47)	1
-47	8804	. CAPACITOR, Fixed, paper, 22,000 micromicrofarads ± 5 percent, 400 volts dc working (CLD) (TWM 4S22)	1
-48	12855	. TERMINAL BOARD	5
		(ATTACHING PARTS)	
-49	503(5/32)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 5/32 in. long (SH) (SEMS)	10
		- - - * - - -	
-50	201(2700)	. RESISTOR, Fixed, composition, 2700 ohms ± 5 percent, 1/2 watt (AB) (EB2725)	1
-51	201(220000)	. RESISTOR, Fixed, composition, 220,000 ohms ± 5 percent, 1/2 watt (AB) (EB2245)	1

Figure & Index No.	ARC Part No.	1 2 3 4 5 6 Description	Units per Assy
2-52	201(470000)	. RESISTOR, Fixed, composition, 470,000 ohms ± 5 percent, 1/2 watt (AB) (EB4745)	5
-53	201(1000)	. RESISTOR, Fixed, composition, 1000 ohms ± 5 percent, 1/2 watt (AB) (EB1025)	3
-54	201(9100)	. RESISTOR, Fixed, composition, 9100 ohms ± 5 percent, 1/2 watt (AB) (EB9125)	1
-55	201(22000)	. RESISTOR, Fixed, composition, 22,000 ohms ± 5 percent, 1/2 watt (AB) (EB2235)	2
-56	201(2200)	. RESISTOR, Fixed, composition, 2200 ohms ± 5 percent, 1/2 watt (AB) (EB2225)	1
-57	201(33000)	. RESISTOR, Fixed, composition, 33,000 ohms ± 5 percent, 1/2 watt (AB) (EB3335)	1
-58	201(47000)	. RESISTOR, Fixed, composition, 47,000 ohms ± 5 percent, 1/2 watt (AB) (EB4735)	2
-59	201(220)	. RESISTOR, Fixed, composition, 220 ohms ± 5 percent, 1/2 watt (AB) (EB2215)	1
-60	201(100000)	. RESISTOR, Fixed, composition, 100,000 ohms ± 5 percent, 1/2 watt (AB) (EB1045)	2
-61	205(27000)	. RESISTOR, Fixed, carbon, precision, 27,000 ohms ± 1 percent, 1/2 watt (IRC) (DCC)	2
-62	201(3300)	. RESISTOR, Fixed, composition, 3300 ohms ± 5 percent, 1/2 watt (AB) (EB3325)	1
-63	201(680000)	. RESISTOR, Fixed, composition, 680,000 ohms ± 5 percent, 1/2 watt (AB) (EB6845)	2
-64	18990	. PLATE ASSY, Terminal (ATTACHING PARTS)	1
-65	503(3/16)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 3/16 in. long (SH) (SEMS)	4
		- - - * - - -	
-66	17786	. SEMICONDUCTOR DEVICE, Diode, Type 1N315	4
-67	201(620)	. RESISTOR, Fixed, composition, 620 ohms ± 5 percent, 1/2 watt (AB) (EB6215)	2
-68	205(51)	. RESISTOR, Fixed, carbon, precision, 51 ohms ± 1 percent, 1/2 watt (IRC) (DCC)	2
-69	205(22000)	. RESISTOR, Fixed, carbon, precision, 22,000 ohms ± 1 percent, 1/2 watt (IRC) (DCC)	2
-70	8617(390)	. CAPACITOR, Fixed, mica, 390 micromicrofarads ± 2 percent, 500 volts dc working (CM20DE391G) (Spec MIL-C-5)	1
-71	8617(220)	. CAPACITOR, Fixed, mica, 220 micromicrofarads ± 2 percent, 500 volts dc working (CM20DE221G) (Spec MIL-C-5)	1
-72	201(27000)	. RESISTOR, Fixed, composition, 27,000 ohms ± 5 percent, 1/2 watt (AB) (EB2735)	1
-73	12709	. CAPACITOR, Fixed, paper, 250,000 micromicrofarads ± 15 percent, 350 volts dc working (ATTACHING PARTS)	2
-74	503(5/32)	. SCREW, Assembled washer, binding head, brass screw, stainless steel lockwasher, nickel plated, 3-48 thd by 5/32 in. long (SH) (SEMS)	4
		- - - * - - -	
-75	16715	. CONNECTOR, Receptacle, electrical (ATTACHING PARTS)	1
-76	16720	. NUT, Knurled (supplied with 75, figure 2)	1
		- - - * - - -	
-77	16714	. CONNECTOR, Receptacle, electrical (ATTACHING PARTS)	1
-78	16720	. NUT, Knurled (supplied with 77, figure 2)	1
		- - - * - - -	
-79	14100	. EMBLEM	1

Figure & Index No.	ARC Part No.	1 2 3 4 5 6 Description	Units per Assy
		(ATTACHING PARTS)	
2-80	8040	. NUT, Hex, brass, nickel plated, 4-40 thd by 0.062 in. thick	1
		- - - * - - -	
-81	7730	. WASHER	1
-82	18323	. PLATE, Identification	1
		(ATTACHING PARTS)	
-83	8081	. SCREW, Self-tapping, round head, phillips recessed, steel, black parkerized, No. 2 by 5/32 in. thick (PK) (Z)	2
		- - - * - - -	
-84	19037	. CHASSIS ASSY	1

SECTION III

NUMERICAL INDEX

Part No.	Figure & Index No.	Total Qty
CM20DE221G	2-71	Ref
CM20DE391G	2-70	Ref
CM20DE511G	2-44	Ref
CM35E103G	2-42	Ref
CM35E472G	2-45	Ref
DCC	2-61	Ref
	2-68	
	2-69	
EB1025	2-53	Ref
EB1045	2-60	Ref
EB2215	2-59	Ref
EB2225	2-56	Ref
EB2235	2-55	Ref
EB2245	2-51	Ref
EB2725	2-50	Ref
EB2735	2-72	Ref
EB3325	2-62	Ref
EB3335	2-57	Ref
EB4735	2-58	Ref
EB4745	2-52	Ref
EB6215	2-67	Ref
EB6845	2-63	Ref
EB9125	2-54	Ref
GB3R31	2-41	Ref
GLU1022SD 3028L	2-35	Ref
GLU2522SD 3028L	2-27	Ref
GLU5022SD 3028L	2-31	Ref
L-1909	2-16	Ref
L-1910	2-18	Ref
L-1913	2-14	Ref
L1882A	2-11	Ref
M-4721	2-29	4
	2-33	
	2-37	
M-4748	2-30	4
	2-34	
	2-38	
M-4761	2-28	4
	2-32	
	2-36	
TWM 4S22	2-47	Ref
TWM 4S47	2-46	Ref
Z	2-83	Ref
1N315	2-66	Ref
1N459	2-43	Ref
103(7/32)	2-23	2

Part No.	Figure & Index No.	Total Qty
10353	2-24	2
11839	2-9	2
12AT7WA	2-8	2
12155	2-5	1
12709	2-73	2
12855	2-48	5
12924	2-25	2
14079	2-39	1
14100	2-79	1
14556	2-22	2
15230	2-20	4
16714	2-77	1
16715	2-75	1
16720	2-76	2
	2-78	
1706	2-13	Ref
17786	2-66	4
17953	2-43	2
18320	2-	1
18323	2-82	1
18352	2-3	1
18760	2-18	1
18761	2-16	2
18762	2-14	1
18763	2-11	1
18990	2-64	1
19037	2-84	1
20049	2-1	1
201(1000)	2-53	3
201(100000)	2-60	2
201(220)	2-59	1
201(2200)	2-56	1
201(22000)	2-55	2
201(220000)	2-51	1
201(2700)	2-50	1
201(27000)	2-72	1
201(3300)	2-62	1
201(33000)	2-57	1
201(47000)	2-58	2
201(470000)	2-52	5
201(620)	2-67	2
201(680000)	2-63	2
201(9100)	2-54	1
205(22000)	2-69	2
205(27000)	2-61	2
205(51)	2-68	2
4041	2-12	2
503(1/4)	2-6	5
503(3/16)	2-15	12
	2-17	

Part No.	Figure & Index No.	Total Qty
503(3/16)(cont)	2-19	
	2-65	
503(5/32)	2-21	24
	2-40	
	2-49	
	2-74	
504(3/16)	2-10	2
513(3/16)	2-2	14
	2-4	
53F13381	2-20	Ref
5814A	2-7	2
7730	2-81	1
8P2H	2-26	Ref
8040	2-80	1

Part No.	Figure & Index No.	Total Qty
8081	2-83	2
8488	2-13	2
8617(220)	2-71	1
8617(390)	2-70	1
8617(510)	2-44	1
8618(10000)	2-42	5
8618(4700)	2-45	1
8665	2-31	1
8735(3.3)	2-41	2
8736	2-35	2
8737	2-27	1
8747	2-46	1
8785	2-26	1
8804	2-47	1

SECTION IV

REFERENCE DESIGNATION INDEX

Reference Designation	Part No.	Figure & Index No.
C601	8618(10000)	2-42
C602	12709	2-73
C603	8618(10000)	2-42
C604	8747	2-46
C605	8804	2-47
C606	8618(10000)	2-42
C607	8617(390)	2-70
C608	8618(10000)	2-42
C609	8617(220)	2-71
C610	12709	2-73
C611	8785	2-26
C612	8618(4700)	2-45
C613	8618(10000)	2-42
C614	8617(510)	2-44
CR601	17786	2-66
CR602	17786	2-66
CR603	17786	2-66
CR604	17786	2-66
CR605	17953	2-43
CR606	17953	2-43
J601	16715	2-75
J602	16714	2-77
R601	201(2700)	2-50
R602	201(220000)	2-51
R603	201(470000)	2-52
R604	201(1000)	2-53
R605	201(620)	2-67
R606	201(620)	2-67
R607	201(33000)	2-57
R608	201(1000)	2-53
R609	8735(3.3)	2-41
R610	8735(3.3)	2-41
R611	201(3300)	2-62
R612	201(470000)	2-52
R613	201(470000)	2-52
R614	8736	2-35
R615	201(1000)	2-53

Reference Designation	Part No.	Figure & Index No.
R616	8736	2-35
R617	205(51)	2-68
R618	205(51)	2-68
R619	201(470000)	2-52
R620	201(22000)	2-55
R621	201(470000)	2-52
R622	201(2200)	2-56
R623	201(22000)	2-55
R624	205(27000)	2-61
R625	205(27000)	2-61
R626	201(100000)	2-60
R627	201(100000)	2-60
R628	201(680000)	2-63
R629	201(680000)	2-63
R630	201(47000)	2-58
R631	201(27000)	2-72
R632	205(22000)	2-69
R633	8665	2-31
R634	205(22000)	2-69
R635	201(47000)	2-58
R636	8737	2-27
R637	201(220)	2-59
R638	201(9100)	2-54
T601	18762	2-14
T602	18763	2-11
T603	18760	2-18
T604	18761	2-16
T605	18761	2-16
V601	12AT7WA	2-8
V602	5814A	2-7
V603	12AT7WA	2-8
V604	5814A	2-7
XV601	15230	2-20
XV602	15230	2-20
XV603	15230	2-20
XV604	15230	2-20